

I CLAIM:

1. A reel-to-reel tape, having first and second surfaces,  
for use in the assembly of semiconductor chips,  
5 comprising:

a plurality of contact lands and a plurality of  
electrically conductive routing lines integral  
with said first surface of said tape; and  
a chip mount pad, secured to said first surface,  
10 coplanar with said second surface.

2. A reel-to-reel tape, having first and second surfaces  
and first and second openings, for use in the assembly  
of semiconductor chips, comprising:

a plurality of electrically conductive routing lines  
15 and a plurality of contact lands on said first  
surface, covering said first openings in said  
tape; and

a chip mount pad in each of said second openings,  
attached to said first surface and shaped to be  
20 coplanar with said second surface.

3. The tape according to Claim 2 wherein said routing  
lines and contact lands are made of copper foil plated  
with nickel and gold.
4. The tape according to Claim 2 wherein said routing  
25 lines and contact lands are created by a  
photolithographic patterning and chemical etch process.
5. The tape according to Claim 2 wherein said bending of  
said chip mount pad is provided by a mechanical coining  
process.
- 30 6. The tape according to Claim 2 wherein said first and  
second openings are created by a mechanical punching  
process.

7. A low-profile, high power semiconductor device including a plastic tape having first and second surfaces, a portion of said first surface covered with an adhesive layer, comprising:

5 first and second openings through said tape and adhesive layer, said first openings configured for solder balls and said second openings configured to accommodate circuit chips; a copper foil laminated on said adhesive layer; 10 portions of said copper foil in said second openings mechanically shaped into a position coplanar with said second surface, for use as chip mount pads; circuit chips mounted by means of a thermally 15 conductive material on each of said chip mount pads; and encapsulating material surrounding said mounted chips.

8. A low profile, high power semiconductor device 20 including a plastic tape having first and second surfaces, comprising:

a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, said lands exposed by first openings in 25 said tape; second openings in said tape configured to accommodate said chips; a chip mount pad in each of said second openings, attached to said first surface and shaped to be 30 coplanar with said second surface; a circuit chip mounted by means of a thermally conductive material on each of said chip mount

pads;

bonding wires connecting said chip to said contact  
lands;

encapsulating material surrounding said first tape  
5 surface including each of said mounted chips and  
said wire bonds; and

solder balls attached to each of said exposed lands.

9. The semiconductor device according to Claim 8 wherein  
said chip mount pads, coplanar with said second tape  
10 surface, provide a direct thermal path to said circuit  
chips.

10. The semiconductor device according to Claim 8 wherein  
said chip mount pads serve as heat convection surface  
for said circuit chips.

15 11. The semiconductor device according to Claim 8 wherein  
said package is created by a transfer molding process  
of molding compounds, thereby providing mechanical  
rigidity to said device even when the device thickness  
is kept to a low profile.

20 12. A method of fabricating a reel-to-reel assembly tape  
having first and second surfaces, said first surface  
having an adhesive layer thereon, for use in the  
assembly of semiconductor devices, comprising the steps  
of:

25 punching first and second openings through said tape  
and adhesive layer, said first openings  
configured for solder balls, and said second  
openings configured to accommodate said chips;  
laminating a copper foil on said adhesive layer;  
30 and  
mechanically shaping portions of said copper foil  
into said second openings, thereby positioning

said portions in the same plane as said second surface.

13. A method of fabricating a reel-to-reel assembly tape for use in the assembly of semiconductor devices, comprising the steps of:

providing a reel-to-reel plastic tape having first and second surfaces, at least a portion of said first surface covered with an adhesive layer; punching first and second openings through said tape and adhesive layer, said first openings configured for solder balls, and said second openings configured to accommodate said chips; laminating a copper foil on said adhesive layer; photolithographically patterning and chemically etching said copper foil, thereby creating a plurality of routing lines and contact pads; mechanically shaping portions of said copper foil into a position coplanar with said second surface; and protecting a portion of said etched foil with a solder mask while plating the exposed portions with nickel and gold.

14. The method according to Claim 13 further comprising the step of singulating individual units from the starting tape.

15. A method of fabricating a low profile, high power semiconductor device, comprising the steps of:

providing a reel-to-reel plastic tape having first and second surfaces and at least a portion of said first surface covered with an adhesive layer; punching first and second openings through said tape

and adhesive layer, said first openings  
configured for solder balls intended to be  
attached to contact lands, and said second  
openings configured to accommodate said chips;  
5 laminating a copper foil on the adhesive layer;  
photolithographically patterning and chemically  
etching said copper foil thereby creating a  
plurality of routing lines and contact pads;  
mechanically shaping portions of said copper foil  
10 into said second openings, thereby bending said  
foil to become coplanar with said second surface;  
and  
protecting a portion of said etched foil with a  
solder mask while plating the exposed portions  
15 with nickel and gold;  
mounting a circuit chip on each of said chip mount  
pads;  
wire bonding said chips to said routing lines;  
encapsulating said first surface of said tape  
20 including said each of said mounted chips and  
bonding wires; and  
attaching solder balls to the surface of said  
contact pads exposed by said first tape openings.

16. The method according to Claim 15 further comprising the  
25 step of singulating individual packaged devices from  
the reel-to-reel tape.

17. The method according to Claim 15 wherein said step of  
encapsulating comprises a transfer molding process of  
molding compounds providing mechanical rigidity to said  
30 device even when the device thickness is kept to a low  
profile.